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Responsibility for the Purity of Chemicals

THE case which has just concluded that will go down to legal history as " Kubach and Another v. Hollands and Another (Fredrick Allen and Sons (Poplar), Ltd., Third Party) " has implications that may be of considerable importance to the chemical industry, and particularly to those who are engaged in manufacturing chemicals. The full judgment will be found on page 121 in this issue of THE CHEMICAL AGE, and it is not therefore necessary to do more than summarise the position here very briefly. A school science mistress went to a firm well known as retailers of chemicals and chemical apparatus—retailers both to schools and to industrial laboratories—and purchased some manganese dioxide for use in the well-known method of preparation of oxygen by heating this substance with potassium chlorate. Unfortunately the manganese dioxide supplied contained some 15 per cent. of antimony sulphide, and when the experiment was performed next day there was an explosion which ultimately resulted in the loss of an eye by one of the pupils.

A point here that strikes the chemist is that there is known to be sometimes danger with commercial manganese dioxide because a little carbonaceous matter may be present, which cannot be detected owing to its colour. The distinction between pure and commercial manganese dioxide is expressed by the difference in price—fourpence a pound as against five shillings a pound.

It does not appear that the school authorities took the precaution of making a prior trial with the unknown material. If this had been done, a serious accident would have been averted, because an experiment performed by a trained chemist to test the safety of a procedure is not likely to be attended with grave results, whereas school children cannot be expected to take precautions. The first point that emerges, therefore, is the desirability that teachers in schools should make prior trial of experiments that might be attended with possible risk. The wonder is that there are not more accidents during the earlier stages of learning chemistry; there can be few chemists who do not recollect having at this stage several more or less disastrous explosions, due generally to their own lack of skill or knowledge. The impurity in the manganese dioxide in this instance, however, was not carbonaceous but one which could not have been anticipated. The jury gave damages against the retailers. The retailers thereupon brought an action for similar damages against the chemical manufacturers. In this they failed for the reasons that are given in the judgment.

The decision was primarily based on the legal grounds that no liability is incurred in the ordinary case of a separate and distinct contract with a third party which was not communicated to the original contractor. It is to be noted that in the judge's words he came to that decision " reluctantly enough." The manufacturers had stated on the invoice that the goods were " accurate as described on leaving our works but must be examined and tested by the user before use." If the retailers had copied this warning on their invoice in turn, it seems likely that they would have been safeguarded. On the other hand, does not some significance attach to the statement that the goods were accurate when leaving the works? Where did the admixture with antimony sulphide occur? The published report of the case leads to the conclusion that no evidence was offered against the view that the admixture occurred before the retailers received the goods; nevertheless in law the manufacturer is still protected by the legal basis, for the decision to which reference has just been made also holds even though the original contract may not have been fulfilled. In plain words, it appears that the onus is on the seller in each instance to safeguard himself against loss due to accident or to spoiled goods incurred by the person to whom he sells.

This decision must affect all merchants and retailers. The chemical manufacturer appears to be immune from damages provided that he is not informed of the purpose for which the goods are to be used. The merchant, however, must either so inform the manufacturer or must take steps to ensure that the goods are as specified. It may be possible for all parties to safeguard themselves legally, and no doubt to the legal mind that would be an adequate solution. We suggest, however, that that solution will not be considered adequate by the chemical industry in general. That industry deals with dangerous substances, or with substances that can cause a good deal of loss if not of adequate purity.

The solution to the difficulty of avoiding unfortunate occurrences such as this one appears to be adequate testing of all substances sold, even if the price has to be increased slightly to pay for the precaution. Manufacturers will doubtless test the batches as manufactured, but it is difficult to ensure that carelessness on the part of the workmen has not nullified the good work of the analyst. It was shown in evidence that the retailer had no laboratory and did not test goods as received. That is, of course, general throughout the country, but we suggest that retailers may find it desirable to buy many chemicals in larger batches and to employ a trained chemist to test incoming goods. We believe that the services that could be rendered by an experienced chemist to retailers and merchants alike would soon be found to exceed the mere safeguarding achieved by testing consignments.

Notes and Comments

Trade and Education

THE chemical industry is participating to a large extent in the general trade prosperity of the country; a sound and healthy prosperity, which is not in the nature of a " boom " with its inevitable sequence of "slump," but steady growth and expansion. Reviewing the period between the slump of about seven years ago and the present time, it is striking that not once did the demand for chemists exceed the supply. Of recent years the country has spent increasingly large sums on the production of qualified chemists, with no apparent regard or interest whether those qualified chemists eventually obtain employment in the chemical industry or not. Even now the effects of over-production of chemists during the last depression are still felt. In trade, whenever the supply of a product exceeds the demand, there are two alternatives open. The first is to cut down that supply, and the second is to increase the demand by exploring new uses to which the product may be put. Neither is being done in the case of the human product, for which the same state of affairs exists. It seems logical that if the Government has provided the higher education necessary to a chemist, then it has a responsibility not only to the individual, but also to the country as a whole, to see as far as possible that the money thus spent is not wasted. When trade is depressed, it is almost impossible to find fresh industries into which chemists might be usefully absorbed and thus the one remaining remedy is to cut down the supply of chemists by a more searching selection of those to whom chemical education by the State is to be afforded.

The Power Transmission Consultant

THE mechanical transmission of power at chemical works can be unusual and complex. There are " rigid " methods and " flexible " methods. Direct-coupled motors, worm reduction units of vertical or horizontal type and spur gears are typical rigid methods, while flexible methods include power transmission to groups of apparatus (or individually) with belting or with chain, V-rope drives, and variable speed gearing. In both cases the enumerated instances are not the only ones. Among rigid methods, for example, there are herring-bone reduction units, as sometimes used for driving large ball mills where high-power shock loads and a high starting torque are in evidence. Each variety of drive, be it rigid or flexible, can show definite instances where it is desirable or can be most economically provided. In all cases there are characteristics and limiting factors which have to be considered, and in the selection of the right kind of power transmission for a given purpose the experience which can be forthcoming by calling in the services of a power expert should not be underrated. Power transmission is a specialised branch of engineering and it is most wise to seek the advice of such a consultant before making a decision to install one particular type of drive rather than another.

Flat Belts and V-Belts

BELTS for power transmission can be flat or V-shaped. In Great Britain, and probably also on the Continent, flat belts are more generally used, as they stop and start machinery very easily by the aid of a forked belt shifter, and speeds of driving equipment can be quickly and easily varied by a change in the diameter of the pulleys. Flat belts, moreover, are suitable for use at a wide range of centres and for both medium and high speeds. V-belts have an ideal field of application at speeds varying from 2,500 to 4,500 feet per minute, especially where the distance between the shaft centres is small, *i.e.*, under 8 or 10 feet. V-belts are quiet in running, they run at low tensions, and in cases where they provide for a drive direct and individually from electric motors, they will fulfil any particular demand for the necessary protection of motors and machinery against shock. Such belts do not require any lubrication or dressing, and they are particularly reliable. They have an outstanding feature in being able to give smooth starting, acceleration and running. From a power transmission point of view the difference between a flat belt and a V-belt is that the latter exerts a larger total force against the face of the pulleys than does the former. For certain types of machinery in the chemical industry, V-belts therefore have advantages.

Helium for Airships

THE announcement that Zeppelin passenger traffic will be resumed in Germany next year is a practical confirmation of the views of Sir Henry Tizard, chairman of the Aeronautical Research Committee. Speaking a few days after the catastrophe to the " Hindenburg," Sir Henry said that that tragic event should not be regarded as the death-blow, as some people thought, to airship travel, which had a low record of fatalities per person carried per mile, but rather as an inevitable occurrence in the development of the airship. The chances of disastrous accidents to airships can be very greatly minimised by the use of helium in place of hydrogen, and if airship travel is to expand in the future it will be necessary to see that adequate supplies of the uninflammable gas are available. Now that the ban on American helium exports has been lifted, it should be possible to obtain sufficient quantities, but as a safeguard for the future, especially in time of war, it would be well to undertake a thorough investigation of the economic and technical possibilities of producing reasonably pure helium by the fractional condensation of air, or the fractional distillation of liquid air, on a semi-large scale.

Exiled Scientists

ACCORDING to the report of the Society for the Protection of Science and Learning, Great Britain has provided situations for 228 German scientists, one hundred of which are permanent, who left their country on account of " racial " persecution. Within Germany the displaced scientists for the most part find that the possibility of publishing their scientific work is diminishing; some are denied access to laboratories or libraries in which privately to continue their research; some have been refused permission to accept invitations abroad. It is therefore gratifying to note the progress in the re-establishment of those outside Germany, a task which enables the exiled scientists to continue in their work, the publication of which would otherwise be impossible.

Plastic Materials from Rubber and Tar Products*

By
Sir GILBERT T. MORGAN and
Dr. D. D. PRATT

AT the request of the Rubber Growers' Association, the Chemical Research Laboratory has recently carried out investigations on new applications of rubber, particularly in conjunction with tars and resins. In the course of this work rubber and its better known modifications have been used.

Natural Rubber and Tars

It was known that rubber was not compatible with high temperature tars and that although anthracene oil dissolves rubber, addition of pitch to such a solution caused immediate separation of the rubber. The problem, therefore, appeared to be that of developing a stabilising medium for anthracene oil—rubber-pitch complexes.

The amount of rubber which can be introduced in one run through the Hurrell homogeniser varies with the type of oil. Low temperature tar oil can absorb 7 to 8 per cent. of its weight of rubber whereas 5 per cent. is the maximum for anthracene oil. The final clear limpid solutions, however, can be utilised as fresh starting material, and solutions containing up to 20 per cent. of rubber can thus be concentrated.

When pitch was added to samples of these solutions of rubber in tar oils, it was observed that whereas the mixtures obtained with low temperature and vertical retort oils were stable, the corresponding products containing high aromatic oils induced a separation of rubber in the form of a coagulum.

On the other hand high aromatic tar oils are unsuitable as a medium for pitch and rubber when the former is in greater concentration than 10.0 per cent. of the mixture quite irrespective of the rubber content.

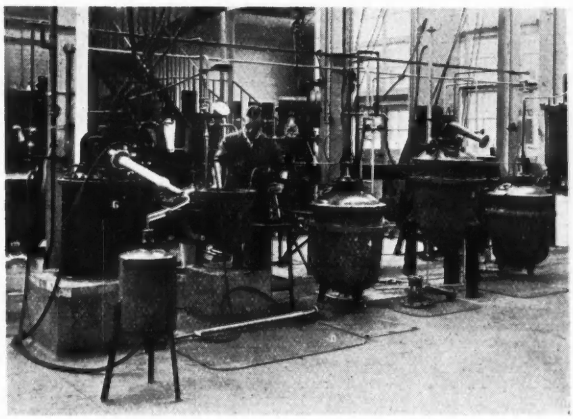
In seeking for an explanation of the differences in behaviour of these tars towards rubber, it is recalled that oils of low aromatic tars are chiefly paraffinoid, and substantially free from the crystalline constituents with which anthracene oil is saturated. It would appear that although the crystalline components of anthracene oil do play an important part in the stability of rubber and pitch mixtures in that oil, yet the paraffinoid oils of low temperature tar form a better medium than the wholly aromatic oils of high temperature tars.

Two possible methods for the preparation of stable complexes of high aromatic tars with rubber are, therefore, suggested. First, the utilisation of a high aromatic oil not saturated with crystalline hydrocarbons obtained by refrigeration and filtration of anthracene oil, or by selection of a distillate such as "dead oil" distilling between the naphthalene and anthracene fractions. The second method of stabilisation suggested is the dilution of a high aromatic tar by an oil substantially free from solid hydrocarbons.

Other Rubbers and Tar

Rubber-tar complexes similar to those derived from latex are obtainable from crepe rubber which, when milled in the presence of tar oils is converted into a plastic material containing approximately 80.0 per cent. of rubber and 20 per cent. of oils. All grades of Rubbone are readily compatible with the various types of tar, this incorporation being accomplished by heating the materials at 120° for 1 hour. The blended products are stable homogeneous liquids of increased viscosity and "stiction" as compared with the original tar.

Vulcanised rubber does not dissolve in tar oils, but forms dispersions which, however, by suitable manipulation can be obtained as gels. When vulcanised latex and tar oils are passed through a colloid mill at 100° C. water is removed and ultimately a clear gel is produced. Such gels are obtainable from vulcanised latex and oils from any type of tar and, furthermore, addition of pitch causes no separation of rubber. A series of results indicated that nitrite crumb is moderately compatible with high temperature tar. Longer treatment at 145° C. of the two components did not lead to any improved products. However, following the conditions described in B.P. 428,100 nitrite crumb was dissolved in tar oils and when pitch was subsequently added stable products containing up to 3.0 per cent. of the modified rubber were produced. When nitrite crumb was used in excess of this proportion coagulation invariably occurred. With tars of paraffinoid type nitrite crumb produces more satisfactory results.



Semi-works scale plant at the Chemical Research Laboratory in which the various tars are prepared.

Chlorinated Rubber and Tars

Chlorinated rubber dissolves readily in tars or tar oils so that the blending of this rubber derivative with tars is very quickly effected by heating a mixture of the components to 100° C. for 2 hours. The most noteworthy feature of the products so obtained is a high degree of elasticity which is a novel property for tar products. Chlorinated rubber has also been blended with vertical retort and with low temperature tars, but it was found that as the tar oils became increasingly paraffinoid so the stability of the final tar-rubber product decreased. It will be noted that the behaviour of chlorinated rubber towards the various types of tars is the converse to that of natural rubber, being readily soluble in "aromatic" tars and less soluble in paraffinoid tars. The property of elasticity conferred by chlorinated rubber, particularly on horizontal retort and coke oven tars, may be attributed in part to the plasticising effect of the tar oils on the rubber derivative and in part to the resinoid contents of the tar acting as a reinforcing "filler." Experiments were carried out on the drying properties of chlorinated rubber-tar products and it was concluded that the addition of small proportions of the rubber derivative accelerated the rate of drying of the tar.

Alternative Method of Preparation

An alternative method has been developed for the preparation of tar products containing chlorinated rubber. When chlorine was passed into solutions of rubber in appropriate tar media, or into dispersions of vulcanised rubber in any tar, products were obtained resembling those furnished by direct solution of chlorinated rubber in tars. It is to be noted that this method of chlorination *in situ* leads to a product consisting of chlorinated rubber in *chlorinated tar oils*. When pitch was added, with the aid of stirring at 120° C., to this material new blends of tar products were produced, exhibiting a high degree of elasticity.

*Abstract of a paper presented before the Midland Section of the Coke Oven Managers Association, Sheffield, May 6, 1937.

Rubber hydrochloride behaves similarly to chlorinated rubber in combination with tars, being readily soluble in high aromatic tars to yield homogeneous, stable products, rather less elastic than the corresponding chlorinated rubber product. On the other hand, this new rubber hydrochloride-tar material possesses improved " stiction " so that its adhesion is superior to that of the chlorinated rubber-tar complex.

Rubber Derivatives and Synthetic Resins

One of the chief applications of synthetic resins of the bakelite type is in the production of insulating materials, and for this purpose the resin is used in conjunction with fillers such as wood meal. Up to the present very little use seems to have been made of rubber as a filler, although rubber itself is a very good insulating material. Experiments, however, suggest that vulcanised rubber may prove a most valuable accessory in combination with bakelite resins.

A series of products ranging from 90 parts of resin and 10 parts of rubber to 10 parts of resin and 90 parts of rubber have been prepared by the following method. The vulcanised rubber was precipitated from " Vultex " (vulcanised latex) in fine particles by the addition of ethyl acetate, filtered, washed thoroughly with acetone to remove the last traces of water and dispersed in benzene. The measured solution of bakelite resin in acetone was then added, care being taken that the ratio of benzene to acetone was 3 : 1 and the mixed solvents removed under reduced pressure. In preparations containing up to 50.0 per cent. of rubber, the material remaining after removal of solvents consisted of a thick homogeneous syrup which slowly hardened to a brittle mass as the last traces of solvent were removed. For moulding purposes these materials were powdered and seived. When the preparations contained more than 50.0 per cent. of rubber they consisted of increasingly resilient materials which could be disintregrated, but not powdered. These rubber-resin complexes were moulded under pressure at 150° C. to yield articles of increasing flexibility as the rubber content increased.

The incorporation of chlorinated rubber with bakelite resin is effected by methods similar to those described in the case of the vulcanised material. In this case, however, the rubber derivative is dissolved in benzene, thus allowing a completely homogeneous blend with the acetone solution of resin. Results suggest that chlorinated rubber may prove to be superior even to vulcanised rubber as a filler in conjunction with bakelite resin.

Other Applications of Chlorinated Rubber

At the present time considerable quantities of chlorinated rubber are being imported mainly for use in the paint industry, but much attention is being given to the development of this material for insulating purposes, owing to a peculiar property it possesses of assuming a vesicular form. The " expanded " modification of chlorinated rubber is effected by submitting the material at 140° C. to pressure which is quickly released at the end of the moulding period. At the Chemical Research Laboratory this property of chlorinated rubber has been extended to the production of a series of laminated products. Chlorinated rubber alone, or in conjunction with fillers such as asbestos can be moulded into machineable products, but these materials are improved by the addition of small proportions of plasticisers such as butyl phthalate.

The increasing attention now being paid to chlorinated rubber led us to examine methods whereby this material might be produced without the intervention of solvents. It was found that liquid chlorine at −40° C. readily reacted with rubber to produce in 10 minutes a product containing 60.0 per cent. of chlorine. By removing excess chlorine at −40° C. under reduced pressure it was established that this reaction between rubber and chlorine took place wholly at this low temperature. The effect of the liquid halogen is first to convert rubber to a jelly-like mass and thereafter, if sufficient time is allowed, to dissolve the rubber completely. This method of chlorination has been applied also to vulcanised rubber, nitrite crumb, rubbone and with partial success to latex.

The Discussion

The CHAIRMAN (Mr. J. Bradwell) congratulated the authors on their valuable work. The production of plastic materials, in a variety of forms, had undoubtedly assumed much importance in recent years. Their applications to both industrial and domestic uses were numerous, and many examples were outstanding where plastics had not only substituted more expensive materials, but were more suitable for the particular purpose required. The lining of chutes and launders with rubber material was being extensively practised. Furthermore, rubber compounds, entirely resistant to the effects of sulphuric acid, could be homogeneously applied as a lining to ammonium sulphate saturators, and, being resilient, overcame the defects inherent with lead-lining. Rubber lifter pipes suitable for ammonia saturators were also being marketed. He asked the authors if any other plastic compounds, possessing resiliency and resistance to acid corrosion, were available, as he had in mind the need for a more suitable lining than lead in the acid tar still on an acid regenerating plant attached to a benzole rectification system.

Dr. PRATT, in opening the discussion, first referred to the problem of blending natural rubber with high aromatic tars, and illustrated, by means of a specimen, the coagulum formed when pitch is added to a solution of rubber in anthracene oil. Although ultimately methods had been devised to overcome this problem, and although all the rubber-tar complexes were of great interest, he particularly wished to draw the attention of the meeting to the products composed of coke oven tar and chlorinated rubber. These materials, specimens of which were handed round for inspection, were characterised by a high degree of elasticity, a property which was novel to tar products and might be of value in road construction.

The particular type of chlorinated rubber used in the experiments was Tornesit, of foreign manufacture, but in this country an equally suitable material, " Alloprene," was manufactured and marketed by Imperial Chemical Industries. Although chlorinated rubber commanded rather a high price, there were alternative methods for the production of these elastic preparations. For example, natural rubber was readily soluble in anthracene oil, and if such a solution was chlorinated, yielding a solution of chlorinated rubber in chlorinated tar oils, a medium was obtained which was compatible with pitch. To the tar industry in general this method would probably be more economical than the purchase or manufacture separately of chlorinated rubber. In preparing the compounds described in the paper, the authors hoped that the members present would be able, from practical and technical experience, to suggest directions in which these new products might be applied. They felt that it was always of advantage to publish information about new preparations so that on occasions industry could avail itself of the results.

Minimum Working Temperature

Mr. F. WHITE asked, with regard to two samples of chlorinated rubber and pitch which had been sent round, at what minimum temperature the material was easily workable in its physical condition. He was thinking of the matter more particularly from the point of view of grouting purposes.

Dr. PRATT said that the temperature at which the tar-chlorinated rubber products became workable depended on the rubber contents, but at 80° to 100° C. the specimen containing 20.0 per cent. of the rubber derivative was fluid but viscous and quite workable. One of the striking effects of adding chlorinated rubber to tars was reduction in viscosity-temperature coefficient, and it was hoped that this change would furnish a solution of the troublesome problem of the " bleeding " of road tars in hot weather.

Mr. E. H. ROWLEY asked if Dr. Pratt could tell the meeting something about the pitches used in the mixtures. Were they all from the same source?

Dr. PRATT said in the course of their experimental work sufficient combination of tars and pitches had been examined to prove that the stability of rubber-tar blends was independent of the source of the pitch.

Mr. W. E. BUCKLEY asked if any of the rubber compounds were non-inflammable. He understood that chlorinated rubber was used for covering cables and had potential uses for underground work.

Dr. PRATT replied that although chlorinated rubber is non-inflammable he did not expect that the relatively small proportions of this material used in their experiments would render the final products appreciably less inflammable.

Coverings for Buried Pipes

Mr. F. J. FINN asked if any of the compounds had been used for protective covering for pipes buried in the ground, such as gas mains. If so, how were they applied, and were they superior to bitumen, or cheaper?

Dr. PRATT said that chlorinated rubber-tar blends had been applied satisfactorily as coatings to iron pipes which were at present buried for test purposes. They hoped that such a coating would remain tough and not become brittle, and thus be of service to firms which manufactured underground pipes. Tornesit was imported, and, as far as their knowledge went, was consumed chiefly in the paint industry. In reply to the Chairman's question, chlorinated rubber itself was stable against acids, but required the addition of an adhesive such as resin to render it suitable for application as a film adherent to surfaces in general.

Mr. W. GARDNER, referring to the use of rubber as a filler, asked what was the relative time required for moulding. Was it longer than other materials?

Dr. PRATT said that he thought rubber-resin mixtures required considerably longer heat treatment under pressure than normal bakelite moulding powders.

Dr. T. H. BLAKELEY said that one must distinguish between two meanings which had been applied to the "drying" of tar. One was the formation of a surface skin, which was good for certain uses of tar, and the other was the hardening of the binder to the point of brittleness. It was in the former sense that drying was mentioned in this paper. The rate at which the viscosity of a binder decreased with rise in temperature might have a bearing on certain road problems. It would be interesting if some figures were available for the alteration in the temperature susceptibility of tars with the incorporation of these rubbers or chlorinated rubbers.

It was said that the incorporation of rubber increased the viscosity of tars. The increase probably depended to some extent on the physical condition of the rubber, but it would be useful to have an approximate guide to the magnitude of the increase—some useful figure to keep in mind for comparison with, say, 3½ per cent. of creosote halving the viscosity of a No. 1 tar.

Dr. PRATT explained that "stiction" was a word coined to denote "adhesiveness," and added that the answer to most of these observations was that as at Teddington, they were not fully equipped to carrying out fundamental physical examination of the products they had submitted these preparations to the Road Research Laboratory.

Dr. BLAKELEY, referring to the elastic behaviour of the materials, said that Messrs. Clark and Hodsman (J.S.C.I., 1937, *56*, 67T) had recently described a very useful apparatus for studying the behaviour of fluids or of plastic bodies in which the rate of shear did not vary linearly with the shearing force applied. An instrument of this type would be quite a useful means of giving quantitative meaning to the visco-elastic properties which were only described quantitatively in the paper.

Vote of Thanks

Mr. W. GREEN said he was sure all the members had been keenly interested in the information that had been put before them. It was entirely new, and showed the avenues now being explored into the uses of various materials. The Chairman described the authors' work as monumental, and the multitudinous number of tests which Sir Gilbert showed them on the screen went some little way to show how colossal was the task of research work. There were so many problems that had to be explored, and every little detail had to be checked and doubly checked to see that no error could arise in the theses.

Mr. VICKERS, in seconding, said they had listened to a lecture which was not only interesting, but very enlightening, and which would give some of them much food for thought.

Sir GILBERT MORGAN, in reply, said it was always a great pleasure for members of his laboratory to visit Sheffield. Dr. Pratt had been heckled that evening, and, had they known that so much attention was likely to be directed to road tar, they might have brought their colleague, Dr. J. G. Mitchell, who specially dealt with those matters and who might have told them more about the tests he was making on those materials. But, as Dr. Pratt had pointed out, all this work was very new. It had been going on barely three years, so that, when it came to duration tests, they could not say very much about the products. Some of them might be relatively expensive. Their work did not consist so much of trying to find an immediate use for their researches; in fact, he thought the best work they were likely to do was that which was being done without any consideration of utility at all. That was perhaps rather a hard thing to say to those who were engaged in industry, but really the fact that Dr. Pratt, for example, knew so much as he did about low temperature tar was because, for some eight or nine years, he was free to work with that material without any consideration as to its utility. In the course of that work, quite accidentally, he had come across several important applications, but it was doubtful if he would have done that if he had originally been beset by problems to be dealt with immediately. That was really the task of a Government Laboratory like theirs, to deal with long range problems, hoping that every now and then something might arise which would interest industrialists.

Bleaching with Sodium Perborate

Conditions of Use with Cotton Fabrics

AN investigation under laboratory conditions has been carried out by Jinkings and McGraghan (*J.S.C.I.*, 1937, *56*, 238-44T) to determine some of the factors which govern the use of sodium perborate as a bleaching agent for laundry work. It was found that aqueous solutions of sodium perborate are stable in acid solution and unstable in alkaline solution, in alkaline solution the degree of stability depending on the *p*H of the solution and the temperature. The higher the *p*H and the higher the temperature the less stable is the solution. The addition of soap to the solutions has a very marked stabilising effect.

No appreciable chemical damage to the fabric is caused by solutions of sodium perborate in the absence of soap even at the boil, unless the concentration of perborate is above 100 grains of $NaBO_3$, $4H_2O$ per gallon. In the presence of soap, however, the damage may be very great under such conditions. Sodium perborate is ineffectual as a bleach in the absence of soap unless used at excessively high concentrations, when the damage to the fabric is extremely great. When soap is present the amount of damage suffered by the fabric is approximately proportional to the concentration of perborate at any specified temperature, but the bleaching properties do not improve with increase of concentration beyond a certain point.

The deterioration of the fabric is cumulative with repeated treatments, but the rate at which it occurs decreases with successive treatments. It is evident that the bleaching process is best carried out in a hot wash liquor or at the boil, when full advantage can be taken of the beneficial action of the soap present. Under no circumstances should the bleaching of cotton fabric be carried out in a liquor free or almost free from soap. It may be taken as a general rule that according to the degree of staining and the distribution of the staining, temperatures between 60° and 100° may be used for bleaching, but the higher is the temperature used the lower should be the concentration of perborate.

Trade Matters in Parliament

Duty on Power Alcohol

IN the House of Commons on July 29 Mr. R. Acland asked the Chancellor of the Exchequer what is the loss to the revenue due to the fact that alcohol used for methylation for power purposes is not liable for Excise duty?

Sir J. Simon: The yield of a duty on power alcohol at the same rate as petrol would amount, at the present rate of consumption, to a little over £100,000 a year.

Mr. Acland then asked the Chancellor of the Exchequer the amount of alcohol freed from excise duty for methylation for power purposes during the first six months of this year, and the corresponding figures for 1935 and 1936; and whether he will state why this alcohol, a large proportion of which is obtained from imported molasses, is not liable to duty?

Sir J. Simon: The quantity of alcohol made into power methylated spirits during the first six months of 1937 was 4,030,000 proof gallons; the corresponding figures for 1935 and 1936 were 708,000 and 1,233,000 proof gallons; with regard to the last part of the question, it has not so far been considered that the scale of consumption made it necessary to tax alcohol as a substitute for petrol.

Mr. Acland: As this activity is so clearly growing, will the right hon. gentleman consider whether it should not be subject to a tax in the Budget next year?

Sir J. Simon: I am, of course, ready to consider the matter.

Oil Extraction in South Wales

On July 30 Sir W. Jenkins asked the Secretary for Mines, what number of schemes has been submitted to his Department from South Wales to extract oil from coal; what number have given satisfactory results; and is the Government prepared to take over any of the schemes or give financial aid to any satisfactory scheme?

Captain Crookshank (in a written answer): A number of proposals have been made to the Government for the establishment of oil from coal plants in the Special Areas, including South Wales, and financial assistance has recently been given to enable a low temperature carbonisation plant to be established in South Wales. As regards the last part of the question, I would refer the hon. Member to the reply I gave on July 20 to three questions by the hon. Members for Pontypool (Mr. Jenkins), Stoke (Mr. E. Smith) and Lewisham West (Sir P. Dawson).

Scrap Iron Supplies

Scarcity Not Sufficient to Raise Prices

A WARNING to people that they must not expect high prices for their scrap iron and steel is contained in a letter to the Minister of Health from the British Iron and Steel Corporation. The appeal to throw out old iron was made in the interest of conserving other valuable resources—that is, our national deposits of iron ore and coal. It was felt, moreover, that, since the home market in scrap iron is now fully organised and prices paid by the steelworks are stabilised, the next logical step was to raise the quantity of old iron offered by householders, traders, and others by reminding them of its uselessness to them and of its usefulness to a basic national industry.

It was inevitable that many people should assume from the fact that this campaign was considered opportune that what might be termed a "scarcity" price could be expected. Strictly speaking, however, no famine of iron and steel scrap exists, but at a time when the constituents of pig iron—which may, within certain limits, be replaced by scrap in the steel furnaces—are in short supply and, similarly, when high prices are being paid for scrap bought abroad it can readily be understood that British steelworks should prefer to buy all the domestic scrap which is available.

Sulphite Lye in Insecticides

Developments at the Long Ashton Research Station

PIONEER work which is likely to have important repercussions is described in the annual report of Long Ashton Research Station. H. W. Carter and Co., Ltd., who have a factory at Bristol for the manufacture of fruit syrups, have now made arrangements with Mr. V. L. S. Charley, of the Fruit Products Section at Long Ashton, whereby experiments will be carried out under actual factory conditions. Mr. Charley, it may be added, already acts for this firm as technical adviser on problems arising in producing fruit syrups on a commercial scale.

Another important development arises out of work conducted on the use of sulphite lye as an emulsifier in the preparation of insecticides. Sulphite cellulose lye is a waste product from the commercial production of wood pulp. The results of new experiments will make it possible to obtain an accurate estimation of the commercial possibilities involved in the introduction of suitable stock emulsions compounded with sulphite lye. It is stated that sulphite lye emulsions would permit far greater use to be made of fruit spray washes than is possible at present with the type of petroleum oil preparations which are now in general use.

Staff changes at Long Ashton Research Station are also noted in the present report. Mr. P. W. Brian, M.A., who resigned to take up an appointment with Imperial Chemical Industries, Ltd., has been succeeded by Mr. C. J. Hickman, M.Sc., of Birmingham University. Mr. E. W. Fajans, Ph.D., who was appointed to full time post on special investigations connected with fungicides and insecticides,, takes on the work formerly in charge of Mr. A. C. Evans, B.Sc. Mr. W. Camps retired from his post as senior laboratory steward on age limit.

Oil from Coal in Australia

A Subsidy Possibly Needed

A SUBSIDY of at least 1s. per gallon would be required for petrol produced from Australian coal, according to expert calculations. For this reason the establishment of oil-from-coal plants is not encouraged by the Commonwealth Government.

The Commonwealth Hydrogenation Committee's report estimates the cost of a hydrogenation plant, capable of producing 45,000,000 gallons of petrol a year from bituminous coal, at about £11,000,000 (Australian currency), and that of a similar plant to treat brown coal at £12,000,000. The report recommended further tests by Imperial Chemical Industries, Ltd., into the application of hydrogenation to black coal, and by I.G. Farbenindustrie to brown coal. It also recommended a large-scale test of the Fischer-Tropsch process in a British country, the cost to be shared by Britain and the Dominions.

A GROWING demand for Ceylon coconut shell charcoal is reported, presumably mainly for the manufacture of gas masks. It was in 1933 that inquiries were first made in Ceylon for coconut shell charcoal for use as a gas mask filling. In 1933 40,377 cwt. of coconut shell charcoal of the value of Rs 90,541, was exported. While the demand from British possessions was negligible, France bought as much as 32,355 cwt. valued at Rs 68,525; the United Kingdom took 5,622 cwt., valued at Rs 16,986. In the following year the demand went up by no less than 300 per cent. In 1935 prices fluctuated, but the demand continued to grow. In that year France took 148,899 cwt. valued at Rs 355,151, out of a total of 153,342 cwt. valued at Rs 365,608. Last year the price steadily went up and although only 135,017 cwt. were exported from Ceylon as against 153,342 cwt. in the previous year, the export value was Rs 377,137, showing an increase of Rs 11,529 over the figure of the previous year.

Loss of Eye in Laboratory Accident

Failure of Claim Against Third Party

ON page 103 of last week's issue of THE CHEMICAL AGE a brief summary was given of the judgment of Lord Hewart, the Lord Chief Justice, in favour of Frederick Allen and Sons (Poplar) Ltd., the third party, on the claim against them by Townson and Mercer, Ltd., the second defendants, in the action in which Miss Marjorie Juliette Kubach was awarded £3,000 damages, and her father £119 special damages against the second defendants for the loss of an eye in an explosion in a laboratory at Park School, Lancaster Road, South Norwood.

In view of the importance of this case, His Lordship's judgment is given in full:—In this case the plaintiffs sued the defendants for damages in the following circumstances. The infant plaintiff is the daughter of the second-named plaintiff and at the material time was a pupil at a school in South Norwood, of which the first-named defendant, Miss Hollands, was owner and headmistress. On January 17, 1936, the infant plaintiff, a girl 13 years of age, was supplied by the teacher of the chemical class with certain materials and apparatus in order that she and the other members of the class might make oxygen. The child, who had carried out a similar experiment in the preceding term, was told to mix certain substances and apply heat to them as she held them in a flask. Almost immediately there followed a loud explosion and her right eye was so severely injured that ultimately, on March 14, it had to be removed.

Purchase of the Chemicals

The facts of the case were for the most part admitted. The visiting science mistress proved that on the day before the happening of the accident she had obtained as usual from the second-named defendants the chemicals for use in the school. She had gone to the shop of those defendants, had read out a list to a shop assistant, and watched him weigh a quantity of potassium chlorate. She asked him if the substance was suitable to be given to children for the preparation of oxygen, and he answered "Yes." She had then asked for some manganese dioxide, and received a pound of black powder so labelled in a paper packet. In fact, however, the black powder contained in the packet was not manganese dioxide but a mixture of 10 parts of antimony sulphide to one part of manganese dioxide. This mixture, according to the evidence, was certain to explode in heat if it was mixed with potassium chlorate, but the mixture of potassium chlorate with manganese dioxide itself would have been harmless. It was further proved that the difference between antimony sulphide and manganese dioxide was not easy to detect by mere inspection but could be very easily detected by means of an extremely simple test.

The evidence showed that the second defendants were in the habit of supplying some 50 per cent. of schools in the neighbourhood of London with chemical substances for the purpose of experiment, and the experienced manager of those defendants said that he knew the experiment of producing oxygen by mixing and heating potassium chlorate and manganese dioxide was one of the most elementary experiments in schools. He identified the label, which incorrectly used the description manganese dioxide, as one of the labels of his company. He proved also that the powder had been bought as manganese dioxide by his company from the third party, and admitted that the invoice received by his company referring to the powder contained the following words: "The above goods are accurate as described on leaving our works but they must be examined and tested by user before use. The above goods are not invoiced as suitable for any purpose, but they are of the nature and quality described." Nevertheless, the second defendants made no examination and no test of the powder before re-sale, nor did they advise the science mistress who made the purchase that examination or test was necessary or desirable before use. It was not suggested that the second defendants communicated to the third party any information to the effect that the manganese dioxide was to be, or might be, resold for the purpose of school experiments.

In that state of the evidence the plaintiffs claimed damages against the first defendant for breach of contract, and for negligence in failing to supply proper materials and in failing to make reasonable or proper examination of the chemicals supplied; and against the second defendants for negligently supplying Miss Hollands with a compound of manganese dioxide and antimony sulphide under the false description of manganese dioxide, and in so causing or permitting a dangerous mixture to be sent to her. So far as the claim for damages for breach of contract as against the first defendant was concerned, it was not pressed by the plaintiffs, on the ground that the first defendant had done nothing that was not reasonable.

In the result the jury found that there was not a breach of contract on the part of the first defendant, but that there was negligence on the part of the second defendants. In answer to the question: "Are the first or the second defendants, or both, responsible for the injury to the infant plaintiff?" the jury answered: "The second defendants only." They awarded £3,000 damages to the infant plaintiff and £119 5s. 6d. which was the agreed amount of the special damage, to the father. I accordingly gave judgment for the first defendant with costs, and judgment for the plaintiffs against the second defendants with costs, together with the usual order as to the costs to be paid.

There followed the hearing of the claim made by the second defendants against the third party for an indemnity, or, alternatively, for contribution, and by consent this claim was tried by me without a jury. A little additional evidence was given to the effect that manganese dioxide could not be rendered dangerous by mere storage, that the substance is used in small quantities for various trade purposes, and that, although there might be a slight risk, there was only a remote risk, where the commercial, as distinguished from the pure, commodity was used.

Commercial Manganese Dioxide

The manager for the second defendants gave evidence that his company always supplied "commercial" or "technical" manganese dioxide for use in schools, that it was commonly used for generating oxygen, and that the price of the "commercial" commodity was 4d. a pound by contrast with 5s. a pound for the "pure" commodity. In cross-examination he said that he never told the third party that the manganese dioxide was required for use in schools; that his company bought scores of different chemicals from the third party on the terms contained in the invoice; and that the company's customers were never told to make a test. He added that he could not tell on sight the difference between manganese dioxide and antimony sulphide, and that his company had not a laboratory on its premises, which were really a shop.

After hearing and considering the very careful arguments of counsel on both sides, I have come, reluctantly enough, to the conclusion that the third party is entitled to succeed. So far as contract is concerned, it appears to be that the governing principle is that which was reiterated by Mr. Justice Bruce in Bostock and Co., Limited v. Nicholson (20 *The Times* L.R. 342 [1904] 1 K.B. 725).

"No liability is incurred in the ordinary case of a separate and distinct collateral contract with a third person uncommunicated to the original contractor or wrong-doer although the non-performance of this contract may in one sense have resulted from the original wrongful act or breach of contract."

Light is also, I think, thrown on the present case by the decision of the House of Lords in Donoghue v. Stevenson (48 *The Times* L.R. 494 [1932] A.C. 562), where it was held that

the manufacturer of an article of food, medicine, or the like, sold by him to a distributor in circumstances which prevent the distributor or the ultimate purchaser or consumer from discovering by inspection any defect, is under a legal duty to take reasonable care that the article is free from defect likely to cause injury to health. In that case Lord Atkin said (48 *The Times* L.R., at p. 504; [1932] A.C., at p. 599):—

"A manufacturer of products which he sells in such a form as to show that he intends them to reach the ultimate consumer in the form in which they left him with no reasonable possibility of intermediate examination, and with the knowledge that the absence of reasonable care in the preparation or putting up of the products is likely to result in an injury to the consumer's life or property, owes a duty to the consumer to take that reasonable care."

The case which is there contemplated is, I think, in essential respects the opposite of the present case. The manganese dioxide which the third party ought to have supplied here to the second defendant might have been resold for a variety of purposes or innocuous compounds or mixtures. The use of it for school experiments was only one of the many possible uses, and the third party, unlike the second defendants, had no notice of the intended use. More than that, it was common ground that a very simple test, if it had been carried out, as the third party's invoice prescribed, and as the first defendant was not warned, would immediately have exhibited the fact that antimony sulphide had erroneously been made up and delivered as manganese dioxide. The second defendants had ample and repeated opportunity of intermediate examination, and, if they had taken the simple precaution which the invoice warned them to take, no mischief would have followed. The like conclusion is illustrated also in Grant v. Australian Knitting Mills, Limited (52 *The Times* L.R. 38 [1936] A.C. 85). It is to be observed also that the jury have awarded damages against the second defendants, not for breach of contract, but for negligence—that is to say, for negligence in omitting to make any test for themselves and yet at the same time concealing from their purchaser the warning contained on the invoice with which they had received the powder.

Finally, it was attempted, although faintly, to derive some assistance for the second defendants from the provisions of the Married Women and Tortfeasors Act, 1935. But the words of section 6 of that statute are, I think, fatal to any such attempt. It is tolerably obvious that the third party here was not "a person who would, if sued, have been liable as a joint-tortfeasor in respect of the same damage." In my opinion there was no joint tort, nor could the plaintiffs have sued the third party. I do not think it possible to contend that the third party was "liable in respect of the same damage" either as a tortfeasor or as a joint tortfeasor.

In the result, therefore, so far as the third party proceedings are concerned, I must give judgment for the third party as against the second defendants, but without costs.

Annual Meeting of Benn Brothers, Limited

Another Satisfactory Financial Year

THE 41st annual general meeting of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, was held at Bouverie House, Fleet Street, London, E.C.4, on July 30.

Sir Ernest Benn, who presided, said that the company's journals ought to be regarded as in the class of educational or financial publications. With that in mind, he uttered a warning against the folly of going modern. So called modern methods must always be given time either to be found out or to establish themselves. Because a few million people got hold of a certain idea for a few weeks, it was stupid to be carried away by the thought that that idea was wisdom or truth. Editorial problems which would present themselves would never be easy, particularly so for some years to come, in a world which was still bothering itself with the opinion that there was something wrong with profit, and still listened to the idea that competition—one of the healthiest forces in the world—was something to be discouraged. The true course had to be considered very carefully, and this must be kept to so that as the truth emerged they would never be found guilty of having deserted it.

If examples were wanted he would refer them to the editorial columns of certain Benn journals which succeeded in keeping a polite attitude to such bodies as marketing boards, but never attempted the folly of making people think that they really believed in such things.

Speaking of the future, Sir Ernest said his view was a very hopeful one. His theory was that for the past 20 years the world had sadly missed men between the ages of 30 and 50. A whole generation of such men had been wiped out by the war, and they were only just getting the first of the next 30-50 generation. The world would be a better place for them. In the meantime they had survived what was commonly admitted to be the maddest 20 years in history. For the next 20 years their work would consist of undoing that of the past 20—which would give them a better chance!

They were beginning to suffer from the rising prices of which everyone was talking—not very much so far, it was true, but nevertheless the indications were there. He had to make the point that with a continuation of the present market tendencies advertisement rates would have to go up. There was no way of escaping from that if things went on as at present. The moral was for advertisement managers to see that their customers took the benefit of long contracts while rates were low.

Dealing with the financial position, Sir Ernest said that the balance sheet and figures called for little comment. They had run on that even course which had been a characteristic of the company in the past few years. Some might think it was a little too even, yet the position was very satisfactory. The sum of £14,000 had been placed to reserve, and as a result the carry-forward was down by between £1,000 and £2,000. Five years ago a subsidiary company had a deficit of £25,000, but that had now largely disappeared. The intervening profits did not appear in the figures at all, thus enabling the directors to tolerate a slight sagging in the carry-forward.

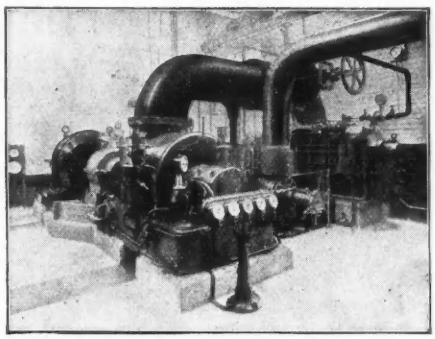
In conclusion Sir Ernest acknowledged the work of his colleagues on the board, and expressed his gratitude to the staff for their loyal and devoted service.

Mr. Gordon Robbins, the deputy-chairman, said he thought that the report was a good one and that the balance sheet was as sound as a bell.

Resolutions were passed approving the report and accounts, and declaring final dividends, less tax, of:—3 per cent. on preference shares, making 6 per cent. for the year; 10 per cent. on ordinary shares, making 15 per cent. for the year; and 2s. per share on the deferred shares, making 3s. per share for the year.

In moving a vote of thanks to the chairman, Mr. B. A. Glanvill referred to Sir Ernest as a great man who had never changed in his attitude to his friends and staff as the years progressed.

Seconding, Mr. E. Cassleton Elliott said he noticed from the report that Sir Ernest had resigned his managing directorship of the company. However, he was to continue as chairman of the board, so that the benefit of his wisdom would still be at the service of the company.



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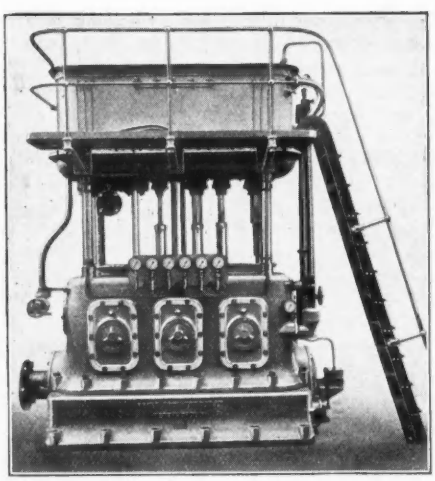

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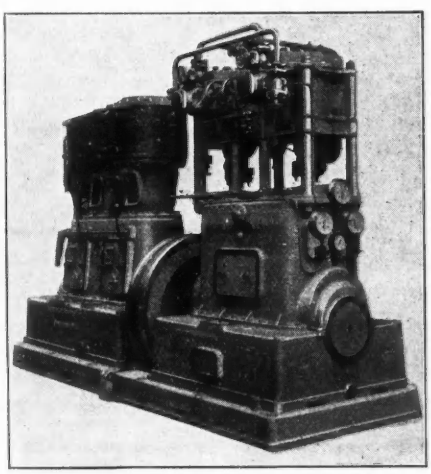

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Oxidation of Acetaldehyde to Acetic Acid

Catalytic Effect of Silica Gels

CATALYSTS of the silica gel group have been found to be superior to any others studied by Foster, in a thesis for the doctor of philosophy degree at the University of Illinois, with regard to both conversion and yield of acetic acid from acetaldehyde. A conversion of 50 per cent. and an 85 per cent. yield of acid were obtained in one pass over an active silica gel, no other catalyst tried giving more than 9 per cent. conversion to acetic acid. A number of mixed catalysts composed of various oxides deposited on and incorporated in silica gels were less active for this partial oxidation than silica gel alone. Comparing different silica catalysts pure silica xerogels and aerogels were found to be very similar in activity. A sample of micro-crystalline silica, commonly known as amorphous silica, showed about half the activity of gel catalysts, but gave the same yield of acetic acid. Quartz sand showed a negligible activity. A xerogel sintered at 940° C. for three hours altered the proportions of the products; the conversion to acid was decreased to about a half and the carbon dioxide to about a fourth of that obtained with the same gel before sintering.

The same conversion to acid was obtained with impure xerogels, but there was less carbon dioxide formed, and the yield of acetic acid was greater. The addition of small amounts of sodium ion (sodium chloride) to pure xerogels had no effect, but fairly large amounts of sodium nitrate as an impurity completely destroyed the activity of the aerogels.

A silica aerogel, with 0.2 per cent. platinum oxide incorporated as a gel, was the most active catalyst studied and, like the other impure gels, produced good yields of acid—about 90 per cent. There was a temperature (usually about 145° C.) for each catalyst above which the percentage of the acetaldehyde oxidised decreased. A plot of conversion against the time during which the reactants were in contact with the catalyst showed that the conversions increased along smooth curves. The results with a platinised aerogel showed that the conversions to acid increased with the air ratio until the theoretical ratio for complete conversion to acetic acid was reached, and then remained substantially constant.

Handling Liquid Chlorine

Precautions to be Observed

A MEMORANDUM on precautions to be observed in the handling, storage and use of liquid chlorine has been issued by the Factory Department of the Home Office (Form 1868) and is obtainable from H.M. Stationery Office, price 2d.

It is stated that cylinders and drums containing liquid chlorine should (*a*) be stored under cover, preferably on a ground floor, not in the main building and not near to any exit from a building, (*b*) be protected from any source of heat or damp, (*c*) not be stored or placed in the neighbourhood of any inflammable material or plant in which fire or explosion is liable to occur, (*d*) be so stored or placed as to allow of ready removal in case of fire; with the last point, as well as convenience in handling in view, cylinders, where practicable, may be kept on wheeled racks.

If the valve of a chlorine cylinder is not easily opened by the valve spanner great force should not be applied to the spanner, nor should lubricants (paraffin oil and the like) be applied to chlorine valves which have become stuck. Heat should on no account be applied to liquid chlorine containers to assist the liberation of gas. It is essential that the compressed air for use with liquid chlorine in tank wagons and storage tanks should be *perfectly dry and free from lubricating oil*, otherwise the presence of moisture alone or moisture and oil will cause corrosion inside the tank.

Leakage of chlorine from connections may easily be traced by means of the white fumes produced by blowing air through ammonia in a reversed wash bottle, the ammonia being directed to any suspected point of leakage. When a container leaks the point of leakage should be turned upwards so as to prevent leakage of liquid.

Dechema Monographs

Ninth Volume Published

THE ninth volume of the "Dechema-monographs" of the Deutsche Gesellschaft für Chem. Apparatewesen E.V. (German Society for Chemical Engineering) has just been published by Verlag Chemie G.m.b.H., Berlin. This volume contains monographs No. 81-88. Three of these monographs treat of "Research in the Field of Chemical Engineering," four deal with "Electrothermics in Chemical Technics," and the remaining one with "Separation of Gases as cause of the Filtration Effect." The first two subjects were originally covered as lectures on the occasion of the tenth general meeting of the Dechema at Munich in 1936, and are now made public for the first time. The monograph on separation of gases as cause of the filtration effect represents work done by W. Mehner, subsidised by Dechema, at the Technological College of Karlsruhe, of which Professor Dr. Kirschbaum is director.

The section on research in the field of chemical engineering contains treatises by P. Duden: "Ten Years' Dechema, Co-operation between Chemist and Engineer"; O. Fuchs: "Extraction of Liquids and Gases with Liquids"; Fr. Prockat: "Physical Principles, Problems and Present Status of Filtration." The section on electrothermics in chemical technics contains treatises by R. Gross: "Problem and Present Status of Application of Electrothermics in Chemical Industry"; W. Hessenbruch: "Selection of Working Material for Generation of Electrical Heat"; O. Meyer: "Electro-Control of Temperature"; A.v. Beaulieu Marconnay: "External and Internal Electrical Heating of Apparatus made from Quartz, with Special Consideration of Internal Heating by Immersion of Heating Tubes." A general index of volumes 1-9 of Dechema-monographs is included.

British Exports to Argentina

Sequel to Trade Pact

FIGURES which are now available to show Great Britain's export trade with the Argentine Republic once again confirm the importance to British industry of the agreement concluded between the two countries in 1933, and renewed after prolonged negotiations in November, 1936.

In 1932 British exports to the Argentine Republic had fallen to a value of less than £11,000,000. From that year to 1936 they rose by stages to more than £15,000,000. According to Board of Trade returns just issued, separately classified British exports during the first half of 1937 amounted to £8,755,609, as compared with £7,326,546 in the corresponding period of 1936, an increase of 19.5 per cent. Assuming that the rate of growth of the first six months of 1937 is maintained, this year will reveal a total increase of close upon £3,000,000.

The British share of this market remains substantially greater than that of any other nation. An analysis by items of the principal British exports to the Argentine Republic during the first half of 1937 shows that the value of chemicals, drugs, dyes and colours amounted to £409,086, as compared with £324,619 for the first half of 1936, an increase of 26 per cent.

A VULCANISATION of rubber, described by Spence and Ferry (*J.S.C.I.*, 137, *56*, 246-9T), is produced by heating latex, from which the diffusible serum constituents have been removed, with potassium ferricyanide in the absence of air. The ferricyanide is reduced to ferrocyanide and a similar effect may be obtained by certain other metallic oxidising agents in the absence of air.

Personal Notes

MR. L. P. KENDAL, M.Sc., Ph.D., has been appointed lecturer in physiological chemistry at Manchester University.

MR. HARGREAVES POLLARD, founder and proprietor of the Victoria Chemical Works, New Mills, died on July 25, at the age of 71.

DR. J. H. SCHULMAN, Ph.D., of Trinity Hall, Cambridge, has been appointed assistant director of research in colloid science for five years.

SIR ROBERT PICKARD, director of the British Cotton Industry Research Association, has been elected vice-chancellor of the University of London for the remainder of the present academic year and for 1937-38. He has been a member of the Senate of the University since 1926.

DR. MARSTON TAYLOR BOGERT, professor of organic chemistry in Columbia University and past-president of the American Chemical Society, has been elected an honorary Fellow of the Royal Society of Edinburgh. Professor Bogert has taught at Columbia for 43 years, and has been professor since 1904. He has carried out notable researches in the synthetic organic chemical field. During the world war he was chief of the Chemical Service Section of the National Army.

MR. THOMAS EDWARD LESCHER, O.B.E., M.P.S., who was chairman of this year's British Pharmaceutical Conference at Liverpool, July 26-30, is the managing director of Evans, Sons, Lescher and Webb., Ltd., manufacturing chemists, of Liverpool and London. Born at Hampstead in 1877, he was educated at Stonyhurst College, Lancashire, and joined the business of Evans, Sons, Lescher and Webb in 1895. After

Mr. T. E. Lescher.

passing the Pharmaceutical Society's Minor Examination he gained experience during two years spent in travelling Australia, New Zealand, and the Far East. After his admission to partnership in 1900, he visited South Africa on a similar business mission. Mr. Lescher has taken a prominent part in Liverpool business affairs. He recently vacated the chairmanship of the Liverpool Chamber of Commerce, after holding that office for two years, and he has also been vice-president of the University of Liverpool Commerce Association, president of the local branch of the United Kingdom Commercial Travellers' Association, and chairman of the Overseas Committee of the Association of British Chambers of Commerce.

MR. G. A. DE BELIN has been appointed to the post of assistant lecturer and research assistant in the Department of Metallurgy at Sheffield University.

MR. JOHN CRABTREE, of Halton, Runcorn, Cheshire, analytical chemist, has left estate valued at £1,980, with net personalty £1,889.

MR. A. G. FARQUHARSON, who for 23 years was local agent at Peterhead for the British Oil and Guano Co., Ltd., has died at the age of 70.

MR. DAVID VASS, who has been gas manager for Perth for 25 years, is to retire. He was chairman of the Scottish Gas Managers' Association, 1909-10. He is now 73 years of age.

MR. HAROLD CARR, head of the biscuit firm of Carr and Co., Ltd., has died at the age of 57, following an operation in a Carlisle nursing home

MR. LEONARD ROPNER, of Stockton-on-Tees, high sheriff of Durham and ex-president of the Shipbuilding Employers' Federation has died in a Leeds nursing home following an operation, aged 64.

MRS. MCGOWAN, the mother of Lord McGowan, chairman of Imperial Chemical Industries, Ltd., has died at the age of 94, while she was on holiday at Kirn, Argyllshire. Lord McGowan is her only son.

MR. A. J. JONES, manager of the chemical works of Evans, Sons, Lescher and Webb, Ltd., Runcorn, was elected to the executive committee of the British Pharmaceutical Society at the annual meeting held in Liverpool on July 29.

DR. WILLIAM WARDLAW has been appointed to the London University chair of physical chemistry at Birkbeck College, as from October 1. Since 1918 he has been on the teaching staff of Birmingham University, where he has held the post of senior lecturer in chemistry since 1926.

MR. C. A. PROCTOR, overseas director of the Dunlop Rubber Co., Ltd.,, has been appointed managing director (commercial), and MR. J. L. COLLYER, director of manufacture, has been appointed managing director (manufacturing), in succession to Sir George Beharrel, the new chairman.

THE EARL OF LEVEN AND MELVILLE, chairman of Borax Consolidated, Ltd., has resigned owing to pressure of work. MR. DESMOND ABEL SMITH has been appointed chairman in his place. Mr. A. H. REID is to be a director of the company to fill the vacancy caused by the death of Mr. R. C. Baker.

MR. FREDERICK GRAINGER and MR. T. A. J. WARD have been elected directors of Titanine Ltd., manufacturers of aeroplane dope and industrial lacquers. On his appointment to the board, Mr. Grainger has resigned his position as secretary of the company; Mr. Leslie Long has been appointed acting secretary.

Foreign Chemical Notes

Denmark

LACTIC ACID PRODUCTION by the fermentation of sugar refinery residues is being planned in Denmark.

Germany

CHLORACETOPHENONE-CONTAINING IRRITANT PREPARATIONS for use in antigas exercises may only be employed in outdoor practice according to a recent decree of the German Air Ministry.

Japan

A SODIUM PEROXIDE FACTORY with a monthly production capacity of 150 tons is to be built by the Japanese Soda Company.

HORMONE PREPARATIONS AND COD LIVER OIL will be produced in a factory at Tsurumi to be built at a cost of 500,000 yen by the Godo Yushin K.K.

From Week to Week

P. H. GALLOWAY, LTD., manufacturing chemists, have opened new premises at 23 Hope Street, Glasgow.

PLANS ARE BEING PREPARED for a new factory at Chain Road, Paisley, for William Forrest and Son, Ltd., Burnbank Chemical Works, Paisley.

RICHARD SIZER, LTD., Cuber Works, Hull, announce that their works are closed from Saturday, July 31, to Monday, August 9, on account of annual holidays.

SHELL-MEX, LTD., AND THE STANDARD OIL CO., have concluded an agreement with the Argentine State oilfields. The latter are to absorb all increase in consumption up to the end of 1941.

A DRYING MACHINE WAS DAMAGED when fire broke out at the bleachworks of Richards, Ltd., Garthdee Road, Bridge of Dee, Aberdeen, on July 30. The action of two automatic sprinklers helped to keep the outbreak in check.

CROFTS (ENGINEERS), LTD., BRADFORD, announce that their works will be closed for the annual holidays from Saturday, August 14, to Monday, August 23, both dates inclusive, and goods will not be received nor ordinarily despatched during this period.

WHILE A PETROL VAN WAS REFILLING an underground tank at a service depot in University Street, Belfast, on August 2, there was a terrific explosion followed by fire. The lorry and some motors were destroyed and windows were smashed in neighbouring houses. Several thousand pounds worth of damage was done before the fire brigade extinguished the flames.

UNITED STATES INCOME TAX has been materially altered by the United States Revenue Act, 1936, which effected a general revision of the taxes on non-resident aliens and foreign corporations. The Department of Overseas Trade has summarised the present position in the form of a circular to firms which are on the Special Register Service of Information.

ACCORDING TO OFFICIAL DATA, exports of petroleum and its derivatives from the Netherlands East Indies during the first four months of 1937 rose from 1,710,008 metric tons to 1,926,652 metric tons, or by about 12½ per cent. The value of these exports, however, has jumped by fully 76.5 per cent., amounting, as it does, to Fl.49,299,000, as against Fl.27,928,000 a year ago.

A DECLARATION OF SOLVENCY has been filed relating to the Gillingham Portland Cement Co., Ltd., which was registered as a public company on June 15, 1920, to acquire the business of the Gillingham Syndicate, Ltd. The authorised capital is £200,000 in £1 shares, of which, to July 2, 1936, 106,690 shares had been issued and fully paid up. The registered office is at Ling House, South Street, Moorgate, E.C.2.

FUEL IN THE NATIONAL DEFENCE was the subject of an address given to the Birmingham Round Table at the Imperial Hotel, Birmingham, on July 29, by Mr. H. W. Voigt, area organiser of the Coal Utilisation Council (Wales and Midland Branch). Mr. Voigt reviewed the uses of British solid fuel in industry generally, and stressed the importance of developing its use by modern methods in preference to the use of imported fuels, of which, he said, far too much was being brought into this country, causing an adverse trade balance of about £105,000,000 with countries outside the Empire from which we buy liquid fuel. Referring to the cost of producing oil from coal in this country, Mr. Voigt said that the prices of imported liquid fuel were rising, and would probably rise still further. During the last war the price of fuel oil rose from 55s. a ton to £16 10s.

THE ITALIAN GOVERNMENT HAS INTRODUCED MEASURES to favour the production of synthetic rubber in Italy and her colonies. These measures include the modification of duties on certain imported products, the exemption from customs duty of imported machinery and raw materials necessary for the production of synthetic rubber, and the granting of other fiscal facilities, subsidies, and financial contibutions. The Finance Minister is also authorised to grant assistance up to 3,000,000 lire (about £32,000) annually for the next five years to approved bodies and companies which undertake appropriate research work.

AN OUTBREAK OF FIRE occurred at the Woodflour Mills, Blantyre, Lanarkshire, on August 3. These mills are owned by Gideon Walker, Ltd., who produce wood flour for the manufacture of linoleum and explosives.

READERS OF THE CHEMICAL AGE who responded last January to the national appeal for the King George V Memorial Fund will be glad to hear of the progress that is being made with the conversion of their shillings and pence into playing fields. The first of such fields to be provided with a commemorative plaque is situated in Hereford, and Queen Mary visited the city last week to perform the unveiling ceremony. It was a happy and almost informal occasion, and Queen Mary was heartily acclaimed for putting the final touch on a movement which must have been very near to her heart. Sir Ernest Benn, the chief proprietor of THE CHEMICAL AGE, represented the King George's Fields Foundation at the ceremony, and was presented to Queen Mary.

CHOCOLATES PREPARED WITH SUGAR MADE FROM WOOD were recently exhibited at a Duesseldorf Exhibition called "A Nation at Work."

OVER 60 MEMBERS OF THE FRENCH ASSOCIATION for the Advancement of Science visited Down House, Kent—the home of Darwin from 1842 to 1882—at the invitation of the British Association last week.

THE FLOTATION OF A COMPANY called Reichswerke ag Fuer Erzbergbau und Einsehuetten "Hermann-Goering," under the auspices of the State, for the development within the framework of the four-years' plan of the manufacture of iron from German ores has been announced.

THE PLANS OF THE PROCTER AND GAMBLE CO., leading soap manufacturers in the United States, to enter the British market in a more active measure, have been confirmed. Not only will the Newcastle and Manchester factories of the company's English subsidiary, Hedley and Co., be enlarged, but a new plant, which will be built in the near future on the bank of the Thames near Purfleet, in Essex, will be used to manufacture granulated soap and flakes.

OIL USED ON THE HYDRAULIC SYSTEM in connection with the water gas plant at the Billingham works of Imperial Chemical Industries, Ltd., caught fire on August 3. The flames reached a considerable height and the oil supply had to be cut off. The I.C.I. Works Fire Brigade, assisted by the Billingham Fire Brigade, was able to extinguish the outbreak after working for half-an-hour. No great damage was done to the plant, which resumed operations in due course, and there were no casualties.

THE PROFESSIONAL TRAINING OF THE CHEMICAL ENGINEER is dealt with in a special publication of the Dechema (German Society for Chemical Engineering) which contains several contributions which have appeared in the "Chemische Fabrik" and which were discussed at the International Chemical Engineering Congress in London, 1936. A copy of this special publication will be sent to those interested in it, free of charge, except for international reply coupon on application to Dechema, Potsdamer-Strasse 103a, Berlin, W.35.

FULL DETAILS ARE NOW AVAILABLE of the plan, foreshadowed by Mr. D'Arcy Cooper at the annual meeting last May, of internal reorganisation for the Unilever group of companies. The scheme has two main objectives—to transfer part of the earning assets to the Dutch section of the combine, so as to avoid double taxation should it become necessary to transfer profits from the English company to the Dutch, and to simplify the whole structure of the group, which will then be able to effect further economies. It is the intention of the company to distribute a larger proportion of its earnings. In future there will be two main companies in place of three: "Lever Brothers and Unilever Ltd.," and "Lever Brothers and Unilever N.V." Lever Brothers, as such, will be amalgamated with Unilever Ltd., and its assets outside the British Empire, principally in America, France, Belgium and Holland, will be transferred to a wholly owned subsidiary of Unilever N.V.

Company News

Tootal Broadhurst Lee Co.—The ordinary dividend is 10 per cent. for the year (same) and 2½ per cent. bonus (against nil).

United Lubricants.—An interim dividend of 4 per cent., actual, less tax, on the participating preference shares for half-year ended March 31, 1932, is payable August 19.

Metallgesellschaft A.G.—Coupons of the 6½ per cent. fifteen year sterling bonds, due April 1, 1937, may now be presented to Helbert, Wagg and Co., Ltd., for exchange for vouchers for conversion class 4 per cent. sterling bonds, third series.

Tunnel Portland Cement.—The maintenance of the interim dividend on the "A" and "B" ordinary shares at 10 per cent., less tax, is announced. The total payment for 1936 was 25 per cent., the final being at the rate of 15 per cent. The dividend will be paid on September 1.

Reckitt and Sons.—A quarterly interim dividend of 1s. a share on the ordinary shares, payable on October 1 next, is announced. This is the same as paid in previous quarters. The total distribution on the 3,648,000 ordinary shares in 1936 was 22½ per cent., the same as in 1935. Payment of the quarterly dividend and interest on the 4½ per cent. and 5 per cent. preference shares and the 4 per cent. debenture stock on the same date is also announced.

Books Received

Colloid Chemistry: Principles and Applications. By Jerome Alexander. Fourth Edition. Pp. 505. London: Chapman and Hall, Ltd. 22s.

Weekly Prices of British Chemical Products

THERE are no price changes to report in the markets for rubber chemicals, wood distillation products, tar products, perfumery chemicals, essential oils and intermediates. Prices for benzol, however, have been reduced for all grades by one halfpenny.

MANCHESTER.—Seasonally quiet conditions have been in evidence on the Manchester chemical market during the past week and the interruption of both contract deliveries and of new business as a result of industrial holidays in the district has been accentuated by the Bank Holiday, markets on the Royal Exchange here being very poorly attended on the resumption on Tuesday. Offers of the alkalis as well as of heavy chemical products generally are, however, on an extremely firm basis, and this is also the case with most of the lighter materials. A certain amount of easiness and uncertainty continue to characterise the market for the tar products and in several sections buying is on more cautious lines than has been the experience for some little time. The spot offers of cresylic acid are at slightly shaded prices and some of the light distillates are also somewhat easier.

GLASGOW.—Business in chemicals has again been rather quiet during the week, both for home trade and export. Prices generally, however, continue steady at about previous figures with no important changes to report. Comparatively quiet conditions prevail in coal tar products, although the tone of the market is optimistic and prices are well maintained. Manufacturers' attentions during the week have centred mainly on existing contract commitments. Bulk deliveries into home consumption include fair volumes of road tars, creosote, naphthas and motor benzol, while shipping reports indicate more than a moderate tonnage of cresylic acid leaving the Clyde. Carbolics continue scarce and little new business is being done; quotations for forward delivery, however, show advances on to-day's values. Virgin oils are in fair demand while standard creosote is about normal. Pyridine supplies are definitely limited.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £30 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

ACID, CHROMIC.—9¼d. per lb., less 2½%; d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%, ex store.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

ACID, SULPHURIC.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

ACID, TARTARIC.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 per ton d/d Lancs.; GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10½d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £16 10s. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—£55 10s. per ton.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish £17 10s., ex store.

BARIUM CHLORIDE.—£10 per ton. GLASGOW: £11 5s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot, 35/37%. £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d

COPPER SULPHATE.—GLASGOW: £24 per ton.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£22 10s. per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £5 7s. 6d. to £6 7s. 6d. per cwt. according to quantity; in drums, £5 to £5 13s. 6d.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LEAD ACETATE.—LONDON: White, £35 10s. per ton; brown, £35. GLASGOW: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £36 10s.; brown, £35 10s.

LEAD NITRATE.—£39 per ton.

LEAD, RED.—SCOTLAND: £38 per ton, less 2½%, carriage paid for 2-ton lots.

LEAD (WHITE SUGAR OF).—GLASGOW: £36 10s. per ton net, ex store.

LITHARGE.—SCOTLAND: Ground, £38 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d. per lb.; powder B.P., 6s. 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

PHENOL.—7¾d. to 8½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39.

POTASSIUM BICHROMATE.—SCOTLAND: 5d. per lb., net, carriage paid.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4½d. per lb. MANCHESTER: £38 per ton.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—£27 per ton. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 11d. to 1s.

POTASSIUM PRUSSATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Firsts lump spot, £41 17s. 6d. per ton d/d in barrels. GLASGOW: Large crystals, in casks, £37.

SALT CAKE.—Unground, spot, £3 16s. 6d. per ton.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks. Solid 76/77°, £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £13 per ton in 1 cwt. kegs, £11 per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. MANCHESTER: 4d. per lb. GLASGOW: 4d., net, carriage paid.

SODIUM BISULPHITE POWDER.—60/62%. £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 5s. per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£26 10s. to £30 per ton. GLASGOW: £1 10s. per cwt., minimum 3 cwt. lots.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHATE.—Commercial, 2 ton lots d/d, £10 5s. per ton; photographic, £15. MANCHESTER: Commercial, £10; photographic, £14 10s.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £7 15s. per ton for 6-ton lots d/d.

Sodium Nitrite.—£18 5s. per ton for ton lots.
Sodium Perborate.—10%, 9½d. per lb. d/d in 1-cwt. drums.
Sodium Phosphate.—£13 per ton.
Sodium Prussiate.—4d. per lb. for ton lots. **Glasgow**: 5d. to 5¾d. ex store. **Manchester**: 4d. to 4¾d.
Sodium Silicate.—£9 10s. per ton.
Sodium Sulphate (Glauber Salts).—£3 per ton d/d.
Sodium Sulphate (Salt Cake).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. **Scotland**: Ground quality, £3 5s. per ton d/d. **Manchester**: £3 12s. 6d.
Sodium Sulphide.—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. **Manchester**: Concentrated solid, 60/62%, £11; commercial, £8.
Sodium Sulphite.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.
Sulphate of Copper.—£20 per ton, less 2%, in casks. **Manchester**: £22 5s. per ton f.o.b. **Scotland**: £24 per ton less 5%, Liverpool, in casks.
Sulphur Precip.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
Zinc Sulphate.—Crystals, £9 per ton, f.o.r., in bags.

Rubber Chemicals

Antimony Sulphide.—Golden, 6½d. to 1s. 1d. per lb., according to quality. Crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.
Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.
Barytes.—£6 to £7 10s. per ton, according to quality
Cadmium Sulphide.—7s. 8d. to 7s. 11d. per lb.
Carbon Bisulphide.—£31 to £33 per ton, according to quantity, drums extra.
Carbon Black.—3 11/16d. to 4 13/16d. per lb., ex wharf.
Carbon Tetrachloride.—£41 to £46 per ton, according to quantity, drums extra.
Chromium Oxide.—Green, 1s. 2d. per lb.
Diphenylguanidine.—2s. 2d. per lb.
India-rubber Substitutes.—White, 4½d. to 5d. per lb.; dark, 3½d. to 4½d. per lb.
Lamp Black.—£22 to £23 per ton d/d London; vegetable black, £28 to £48.
Lead Hyposulphite.—9d. per lb.
Lithopone.—30%, £16 10s. to £17 5s. per ton.
Sulphur.—£9 to £9 5s. per ton. **Sulphur precip. B.P.**, £55 to £60 per ton. **Sulphur precip. comm.**, £50 to £55 per ton.
Sulphur Chloride.—5d. to 7d. per lb., according to quantity.
Vermilion.—Pale, or deep, 5s. 3d. per lb., 1-cwt. lots.
Zinc Sulphide.—10d. to 11d. per lb., according to quality.

Nitrogen Fertilisers

Sulphate of Ammonia.—The following prices have been announced for neutral quality basis 20.6= nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1932; August, 1937, £7 3s. 6d. per ton; September, £7 5s.; October, £7 6s. 6d.; November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
Calcium Cyanamide.—No prices have yet been announced for delivery after July 31.
Nitro-Chalk.—£7 10s. 6d. per ton for delivery up to June 30, 1938.
Nitrate of Soda.—£8 per ton for delivery up to June 30, 1938.
Concentrated Complete Fertilisers.—£10 12s. to £11 1s. per ton for delivery up to August 31, in 6-ton lots to farmer's nearest station.
Ammonium Phosphate Fertilisers.—£10 5s. to £13 5s. per ton for delivery up to August 31, in 6-ton lots to farmer's nearest station.

Coal Tar Products

Acid, Cresylic.—97/99%, 5s. 3d. to 5s. 6d. per gal.; 99/100%, 5s. to 6s., according to specification; pale 99%, 5s. 6d. to 5s. 8d.; dark, 4s. 8d. to 4s. 10d. **Glasgow**: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. 4d. to 2s. 6d. American specification, 4s. 3d. to 4s. 6d. **Manchester**: Pale, 99/100%, 4s. 10d.
Acid, Carbolic.—Crystals, 7¾d. to 8½d. per lb.; crude, 60's, 4s. 3d. to 4s. 6d. per gal. **Manchester**: Crystals, 9d. per lb. f.o.b. in drums; crude, 4s. per gal. **Glasgow**: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's, 4s 4d. to 4s. 8d.
Benzol.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. **Glasgow**: Crude, 10d. to 10¼d. per gal.; motor, 1s. 4d. to 1s. 4½d.
Creosote.—B.S.I. Specification standard, 6d. per gal. f.o.r. Home, 3¾d. d/d. **London**: 4½d. f.o.r. North: 5d. London. **Manchester**: 5½d. to 6½d. **Glasgow**: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5½d. to 5¾d.
Naphtha.—Solvent, 90/160%, 1s. 7d. to 1s. 8d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 90/190%, 1s. 2d. to 1s. 3d. **London**: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. **Glasgow**: Crude, 6d. to 6¾d. per gal.; 90% 160, 1s. 7d. to 1s. 8d., 90% 190, 1s. 2d. to 1s. 3d.
Naphthalene.—Crude, whizzed or hot pressed, £10 to £11 per ton; purified crystals, £18 to £20 per ton in 2-cwt. bags. **London**: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. **Glasgow**: Fire lighter, crude, £6 to £7 per ton (bags free). **Manchester**: Refined, £21 per ton f.o.b.
Pitch.—Medium, soft, 38s. per ton, in bulk at makers' works. **Manchester**: 36s. f.o.b., East Coast. **Glasgow**: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
Pyridine.—90/140%, 9s. to 10s. per gal.; 90/180, 2s. 9d. to 3s. 6d. **Glasgow**: 90% 140, 9s. to 10s. per gal.; 90% 160, 7s. to 8s.; 90% 180, 2s. 6d. to 3s. **Manchester**: 9s. to 10s. at works.
Toluole.—90%, 2s. per gal.; pure, 2s. 6d. **Glasgow**: 90%, 120, 1s. 11d. to 2s. per gal.
Xylol.—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. **Glasgow**: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

Acetate of Lime.—Brown, £8 5s. to £8 15s. per ton; grey, £10 10s. to £11 10s. Liquor, brown, 30° Tw., 6d. to 8d. per gal. **Manchester**: Brown, £9 10s.; grey, £11 10s.
Charcoal.—£6 5s. to £12 per ton, according to grade and locality.
Methyl Acetone.—40-50%, £42 to £45 per ton.
Wood Creosote.—Unrefined 6d. to 1s. per gal., according to boiling range.
Wood, Naphtha, Miscible.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
Wood Tar.—£3 to £4 per ton.

Intermediates and Dyes

Acid, Benzoic, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.
Acid, Gamma.—Spot, 4s. per lb. 100% d/d buyer's works.
Acid, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
Acid Naphthionic.—1s. 8d. per lb.
Acid, Neville and Winther.—Spot, 3s. per lb. 100%.
Acid, Sulphanilic.—Spot, 8d. per lb. 100%, d/d buyer's works.
Aniline Oil.—Spot, 8d. per lb., drums extra, d/d buyer's works.
Aniline Salts.—Spot, 8d. per lb. d/d buyer's works, casks free.
Benzidine, HCl.—2s. 5d. per lb., 100% as base, in casks.
m-**Cresol** 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-**Cresol** 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-**Cresol** 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
Dichloraniline.—1s. 11½d. to 2s. 3d. per lb.
Dimethylaniline.—Spot, 1s. 6d. per lb., package extra.
Dinitrobenzene.—7½d. per lb.
Dinitrochlorbenzene, Solid.—£72 per ton.
Dinitrotoluene.—48/50° C., 8½d. per lb.; 66/68° C., 10d.
Diphenylamine.—Spot, 2s. per lb., d/d buyer's works.
α-**Naphthol.**—Spot, 2s. 4d. per lb., d/d buyer's works.
β-**Naphthol.**—9½d. to 9⅝d. per lb.; flake, 9½d. to 9⅝d.
a-**Naphthylamine.**—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.
β-**Naphthylamine.**—Spot, 2s. 9d. per lb., d/d buyer's works in casks.
o-**Nitraniline.**—3s. 11d. per lb.
m-**Nitraniline.**—Spot, 2s. 7d. per lb., d/d buyer's works.
p-**Nitraniline.**—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.
Nitrobenzene.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
Nitronaphthalene.—9d. per lb.; P.G., 1s. 0½d. per lb.
Sodium Naphthionate.—Spot, 1s. 9d. per lb., 100% d/d buyer's works.
o-**Toluidine.**—10½d. per lb., in 8/10-cwt. drums, drums extra.
p-**Toluidine.**—1s. 10½d. per lb., in casks.
m-**Xylidine Acetate.**—4s. 3d. per lb., 100%.

Latest Oil Prices

London, Aug. 4.—**Linseed Oil** was easier. Spot, £32 5s. (small quantities); Aug., £29 10s.; Sept.-Dec., £29 5s.; Jan.-April, £29 10s., naked. **Soya Bean Oil** was quiet. Oriental (bulk), afloat, Rotterdam, nominal. **Rape Oil** was quiet. Crude extracted, £37 per ton; technical refined, £38, naked, ex wharf. **Cotton Oil** was easier. Egyptian crude, £28 per ton; refined common edible, £31; deodorised, £33, naked, ex mill (small lots £1 10s. extra). **Turpentine** was unchanged. American, spot, 36s. per cwt.
Hull.—**Linseed Oil.**—Spot quoted £30 6s. 3d. per ton; Aug., £29 12s. 6d.; Sept.-Dec. and Jan.-April, £29 10s. **Cotton Oil.**—Egyptian, crude, spot, £28 per ton; edible, refined, spot, £31; technical, spot, £31; deodorised, £33, naked. **Palm Kernel Oil.**—Crude, f.m.q., spot, £25 10s. per ton, naked. **Groundnut Oil.**—Extracted, spot, £31 per ton; deodorised, £34. **Rape Oil.**—Extracted, spot, £36 per ton; refined, £37. **Soya Oil.**—Extracted, spot, £31 per ton; deodorised, £34. **Cod Oil.**—F.o.r. or f.a.s., 27s. 6d. per cwt., in barrels. **Castor Oil.**—Pharmaceutical, 44s. 6d. per cwt.; first, 39s. 6d.; second, 37s. 6d. **Turpentine.**—American, spot, 38s. 6d. per cwt.

New Companies Registered

L. W. Kinleside, Ltd.—Registered July 15. Capital £100 in 100 ordinary shares of £1 each. To carry on the business of wholesale, retail and dispensing chemists and druggists, etc. Directors: Leo. W. Kinleside, John H. Johnson. Registered office: 13 Windsor Street, Essex Road, N.1.

J. Fielding (Soap Manufacturers), Ltd.—Registered July 31. Capital £500 in 500 ordinary shares of £1 each. To carry on the business of soap manufacturers and merchants, oil refiners, chemists and druggists, etc. Directors: Emily Fielding and Edward R. Smith. Registered office: Arundel Chambers, 10 St. Paul's Street, Leeds.

W. Houlder, Son & Co., Ltd.—Registered August 3. Capital £15,000 in 15,000 shares of £1 each. To acquire the business of a chemical and sulphuric acid manufacturer carried on by Bertram E. Houlder at White Street, Southall, Middlesex. Directors: Bertram E. Houlder, Beryl E. Hayes, and James Basley. Registered office: The Chemical Works, White Street, Southall, Middlesex.

Sissons Brothers & Keirans, Ltd.—Registered July 27. Capital £42,000 in 30,000 6 per cent. cumulative preference and 12,000 ordinary shares of £1 each. To carry on the business of manufacturers and merchants of paints, colours, enamels, water paints, etc. Directors: Thomas B. Sissons, Swanland Garth, North Ferriby, East Yorkshire, varnish and colour manufacturer; Joseph A. Dew; Francis F. A. Keirans; Patrick J. Munden, Valentine P. Keirans.

Green & Barker, Ltd. Registered July 28. Capital £100 in 2,000 shares of 1s. each. To carry on the business of manufacturers of petroleum, petrol, oils, spirits, colloidal fuel and other substances from any mineral (including coal and mineral oil) by synthesis or by any process of amalgamation, distillation or otherwise, and to adopt an agreement with Arthur T. de Valon Green. Directors: Arthur T. du Valon Green, 47 Gwyndwr Road, W.14, advisory chemist; and Frederick W. Barker.

Super Enamels, Ltd.—Registered July 19. Capital, £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturers of and dealers in paints, colours, varnishes, lacquers (transparent or pigmented) cellulose products and solvents, bituminous paints, enamels, shellac, gums, zinc oxides, lithopones, colours, painters, oils, turpentines, etc. Directors: Harry Dare, Heath Lodge, Copt Heath, Knowle, Warwickshire; John C. Nathaway, Kenneth B. Pearce.

Electric Converter Furnaces, Ltd.—Registered July 24. Capital £5,000 in 2,500 preferred ordinary shares of £1 and 50,000 deferred ordinary shares of 1s. each. To carry on the business of manufacturers of calcium, carbide, nitro-lime and cyanamide, ironmasters, iron and brass founders, steel makers, blast furnace proprietors, shipbuilders, shipwrights, dock and wharf proprietors, sand-blast workers, electrical engineers, etc. Directors: Thos. D. Kelly and Rupert Blandy. Registered office: 190 Imperial House, Regent Street, W. 1.

Scottish Medical Peat Co., Ltd.—Registered July 24. Capital £250 in 1,000 shares of 5s. each. To carry on the business of manufacturing chemists, druggists, general merchants, etc. Subscribers: Alastair Maclean, 93 Hope Street, Glasgow, C.2, and Peter McGilligan.

Residues (Metal and Chemical), Ltd.—Registered July 31. Capital £100 in 100 shares of £1 each. To carry on business as merchants, dealers, exporters and importers of and in waste and scrap materials of all kinds, etc. Directors: Richard W. Erbert and Henrik Klein. Registered office: Vulcan House, 56 Ludgate Hill, E.C.4.

"Karbex," Ltd.—Registered July 28. Capital £5,000 in £1 shares (3,000 "A" ordinary and 2,000 "B"). To acquire the whole or any part of the right title and interest in, or apertaining to, the trade mark "Karbex," No. 574,636, relating to a fire extinguishing powder or substance, and to carry on the business of manufacturers of powders, fluids, compounds and chemicals for the extinguishing, prevention, protection and safeguarding of fire, etc. Subscribers: Richard P. Care and Frank E. Perry. Secretary: Frank E. Perry, 48 Park Place, Cardiff.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

TOWNSON & MERCER, LTD., London, E.C., manufacturers of scientific apparatus, etc.—July 22, two charges, to Barclays Bank, Ltd., each securing all moneys due or to become due to the Bank; charged on 390 Sydenham Road, North Croydon, and 34 Camomile Street, E.C. *Nil. November 19, 1936.

Satisfactions

DONCASTER COALITE, LTD., London, S.W.—Satisfaction July 23, of debentures registered November 11, 1929, and June 20, 1932, to extent of £8,000.

BRITISH INDESTRUCTO GLASS, LTD., London, E.C.—Satisfaction July 22 of debentures registered October 29, 1936, to extent of £925.

Chemical and Allied Stocks and Shares

THE continance of more buoyant conditions in the industrial and other sections of the stock and share markets has led to a broadening of interest and an increase of activity in **shares of companies identified with the chemical and kindred trades.**

Imperial Chemical have continued to attract considerable attention and have moved up further from 38s. 1½d. to 39s. 4½d. Unilever and Unilever N.V. were in demand at higher prices in advance of publication of the consolidation scheme relating to companies in the group, but **Lever preference are unchanged** at the time of writing. International Nickel were again active and at $65¾ have made a higher price on the week. Although the quarterly dividend is again kept at 50 cents per share, the market is continuing to assume that the profits for the past quarter will show a further rise; and is still budgeting for a total dividend in excess of $2 per share for the year. **Bradford** Dyers, Courtaulds and Calico Printers were among other shares which were also assisted by this tendency. Results of the last named company fall to be issued shortly, and although the market appears less hopeful in that a payment in respect of preference dividend arrears will be announced, it will be somewhat surprising if improved earnings are not shown.

Boots Pure Drug are 6d. higher at 52s. 6d., and demand remained in evidence for Timothy Whites and Taylors, which have risen further from 34s. 6d. to 36s. Sangers were again 26s. 3d., and continued to be held steadily, attention being drawn to the company's excellent profit-earning record and to the reasonable possibility that it will maintain its dividend despite the increase in capital. British Plaster Board were out of favour, but at 33s. have recovered a moderate part of their recent decline. Associated Portland Cement at 91s. 3d. also show a small improvement, but sentiment regarding shares of companies with interests in the building trades continued to be affected by the fear that the period of rising profits and dividends has now passed. Goodlass Wall and Lead Industries were, however, higher on balance at 13s. Pinchin Johnson and other paint shares were again firm, awaiting the interim dividends.

Cooper, McDougall & Robertson continued to be held firmly on the prospect of good recovery in profits in the future, granted improvement in the South American republics and other agricultural countries is continued. Fison, Packard and Prentice were steady around 39s. Although some time may perhaps have to elapse before full benefits of the expansion of the business are reflected in profits, the assumption in the market is that profits of the latter company are probably rising and that the dividend is likely to be at least maintained. B. Laporte transferred six around 105s. United Glass Bottle were again 53s. and Canning Town Glass were also well maintained, as were British Indestructo Glass and most other shares of glass companies. Triplex Safety Glass were favoured and have risen further to 72s. 3d. The results of the latter company are expected this month and the dividend announcement may be made shortly. As mentioned here before, the market is inclined to look for a dividend of 35 per cent., although in view of the much larger capital arising from the bonus distributions, a payment of 30 per cent. would have to be regarded as an excellent achievement. Borax Consolidated deferred shares came in for attention and have improved to 30s. 9d.

Richard Thomas, Dorman Long and other prominent iron and steel shares made higher prices in response to the better general market conditions. Staveley Coal and Iron continued to attract attention on expectations of a larger dividend. Oil shares remained uncertain, partly owing to the view expressed in some quarters that a further reduction in the price of petrol may be in prospect unless tanker freight rates rise.